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July 1999

ToxFAQs™ for Thorium
(*Torio*)

CAS# 7440-29-1

This fact sheet answers the most frequently asked health questions about thorium. For more information, you may call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Thorium is a radioactive substance that occurs naturally in the environment. It has been shown to cause an increase in cancers of the lung, pancreas, and blood in workers exposed to high levels of it in the air. This chemical has been found in at least 16 of the 1,177 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is thorium?

Thorium is a naturally occurring, radioactive substance. In the environment, thorium exists in combination with other minerals, such as silica. Small amounts of thorium are present in all rocks, soil, water, plants, and animals. Soil contains an average of about 6 parts of thorium per million parts of soil (6 ppm).

More than 99% of natural thorium exists in the form of thorium-232. It breaks down into two parts-a small part called "alpha" radiation and a large part called the decay product. The decay product is also not stable and continues to break down through a series of decay products until a stable product is formed. During these decay processes, radioactive substances are produced. These include radium and radon. These substances give off radiation, including alpha and beta particles, and gamma radiation.

Some rocks in underground mines contain thorium in a more concentrated form. After these rocks are mined, thorium is usually concentrated and changed into thorium dioxide or other chemical forms. After most of the thorium is removed, the rocks are called

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"depleted" ore or tailings.

Thorium is used to make ceramics, gas lantern mantles, and metals used in the aerospace industry and in nuclear reactions. Thorium can also be used as a fuel for generating nuclear energy.

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What happens to thorium when it enters the environment?

- Thorium is a natural part of the environment.
- Thorium changes extremely slowly into other radioactive substances.
- It takes about 14 billion years for half of the thorium-232 to change into new forms.
- As rocks are broken up by wind and water, the thorium and all other components of the rocks become part of the soil.
- Thorium in soil can be washed into rivers and lakes.
- Windblown dust and volcanic eruptions are natural sources of thorium in the air.
- Burning coal may release small amounts of thorium into the air.
- Mining thorium or making products that contain it may also release thorium into the environment.

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How might I be exposed to thorium?

- Just by being alive, everyone is exposed to small amounts of thorium in air, water, and food.
- Breathing air near facilities where uranium, phosphate, or tin ore is processed.
- Living in homes built on soil with high levels of thorium.
- Working in the uranium, thorium, tin, and phosphate mining, and gas mantle production industries may expose you to higher levels of thorium.
- Living near radioactive waste disposal sites.

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How can thorium affect my health?

Studies on thorium workers have shown that breathing high levels of thorium dust results in an increased chance of getting lung disease. Liver diseases and effects on the blood were found in people injected with thorotrast, a thorium compound injected into the body as a radiographic contrast medium between the years 1928 and 1955. Animal studies have shown that breathing thorium may result in lung damage.

Studies on exposed human populations have not reported any birth defects or effects on a person's ability to have children.

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How likely is thorium to cause cancer?

Workers who had high exposures to cigarette smoke, radon gas, and thorium had cancers of the lung, pancreas, and blood. People who had large amounts of thorium injected into their blood for special x-ray tests had more than the usual number of liver tumors, cancers of the blood, such as leukemia, and tumors of the bone, kidney, spleen, and pancreas.

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Is there a medical test to show whether I've been exposed to thorium?

Special tests that measure the level of radioactivity from thorium in your urine and feces, and radon gas in the air you exhale can determine if you have been exposed to thorium. These tests are only useful if done within several days to a week after exposure. The tests cannot tell you if your health will be affected by the exposure. They require special equipment and are probably not available at your local clinic or hospital.

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Has the federal government made recommendations to protect human health?

The EPA has set a drinking water limit of 15 picocuries per liter (15 pCi/L) of water for gross alpha particle activity and 4 millirems per year for beta particles and photon activity (for example, gamma radiation and x-rays).

The federal recommendations have been updated as of July 1999.

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Glossary

CAS: Chemical Abstracts Service.

National Priorities List: A list of the nation's worst hazardous waste sites.

Millirem (mrem): A unit used to measure radiation dose.

Picocurie (pCi): A unit used to measure the intensity of radiation.

ppm: Parts per million.

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References

Agency for Toxic Substances and Disease Registry (ATSDR). 1990. Toxicological Profile for thorium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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Where can I get more information?

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat

illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

For more information, contact:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333
Phone: 1-888-42-ATSDR (1-888-422-8737)
FAX: (770)-488-4178
Email: ATSDRIC@cdc.gov

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